

FIGURE 1

NZ MASK: Implant subcollector

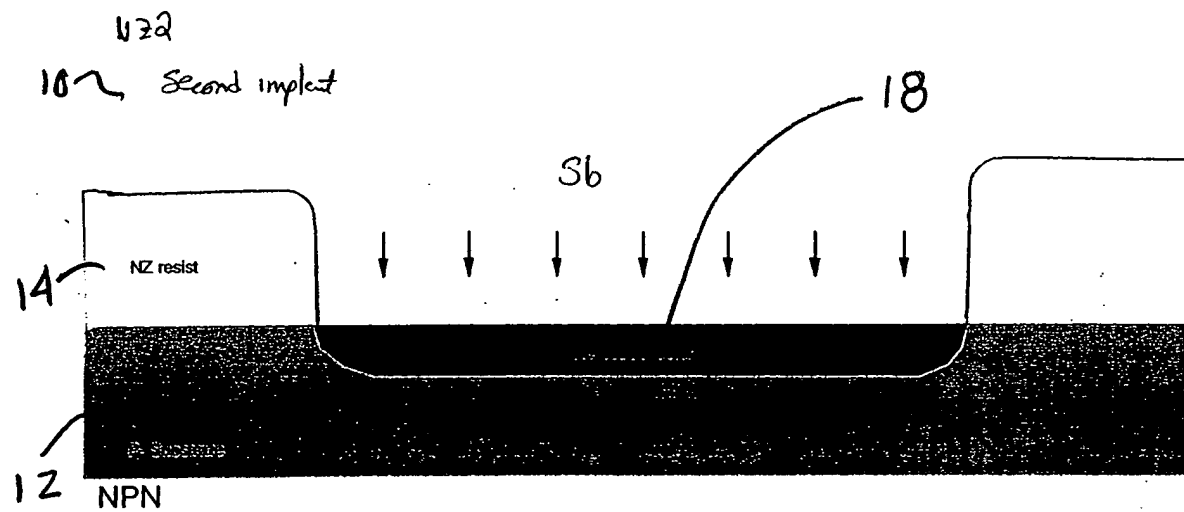


FIGURE 2

FOOTPRINT 14150

After N- EPI

102

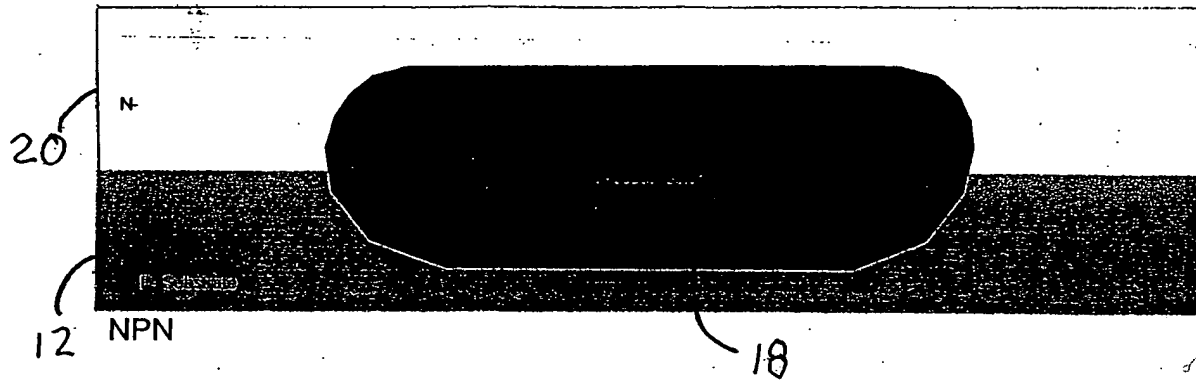


FIGURE 3

099142-11601
FOUO "24T660

DT Mask: Etch Deep trench; implant channel stop; fill deep trench

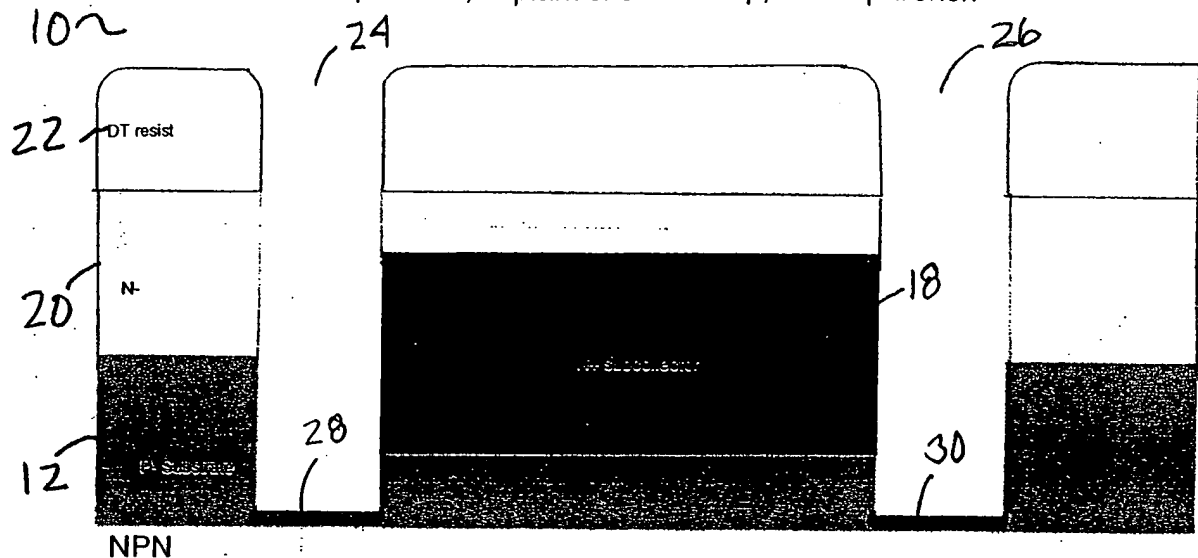


FIGURE 4

09991442-113601

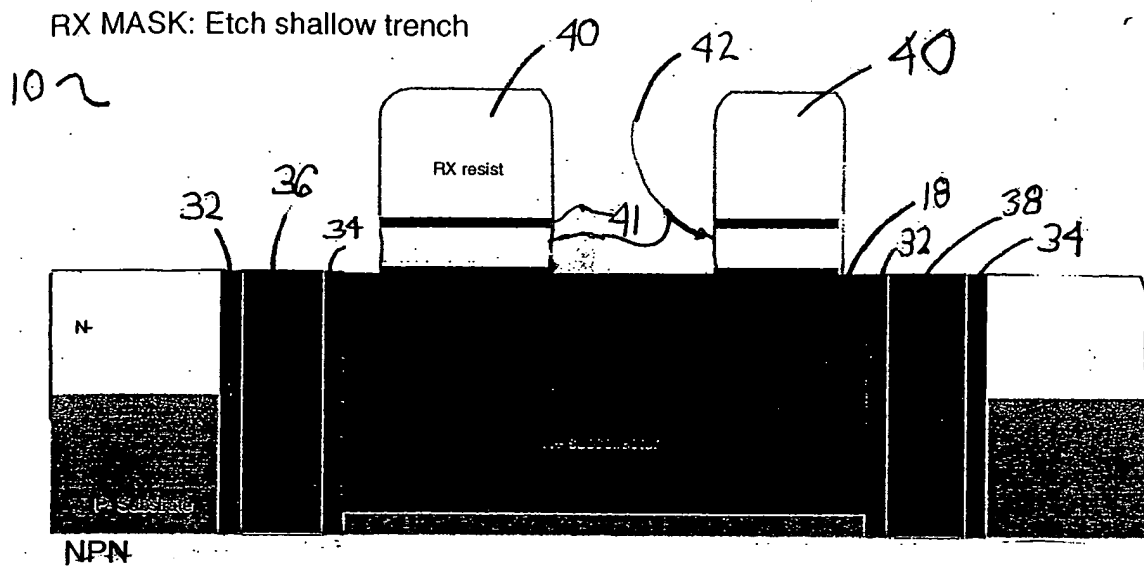


FIGURE 5

FIGURE 5

After AB trench planarization and pad nitride strip

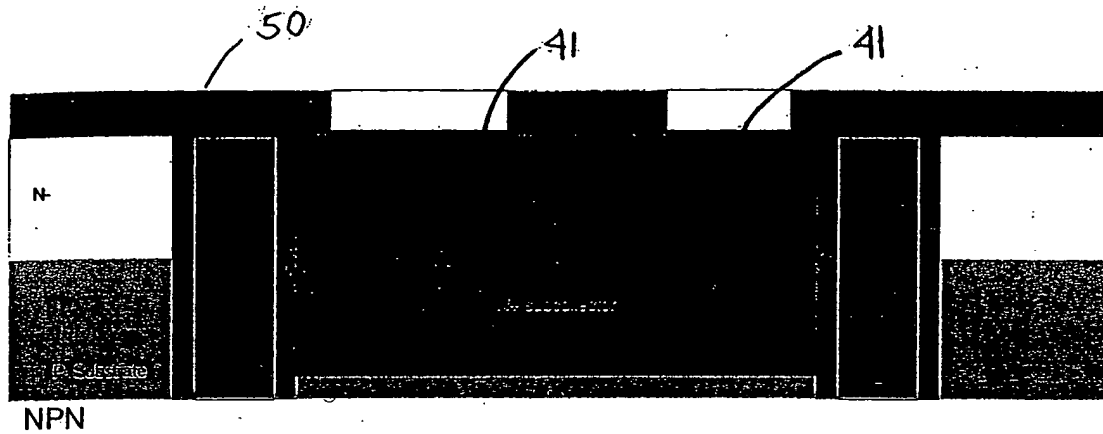


FIGURE 6

FOOTPRINT 24T660

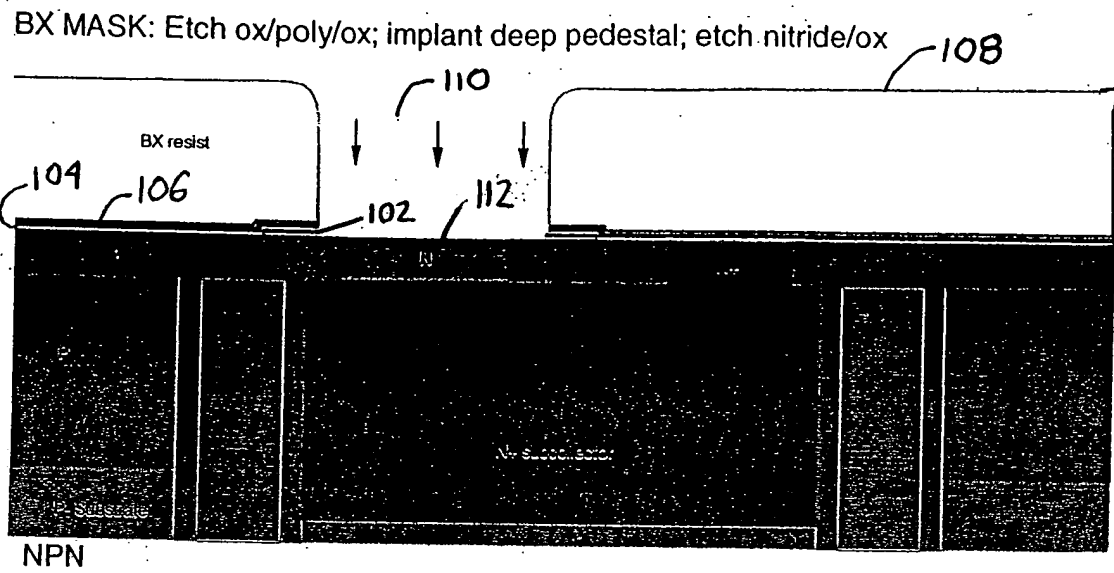


FIGURE 7

FIGURE 7

After LTE EPI and base films deposition

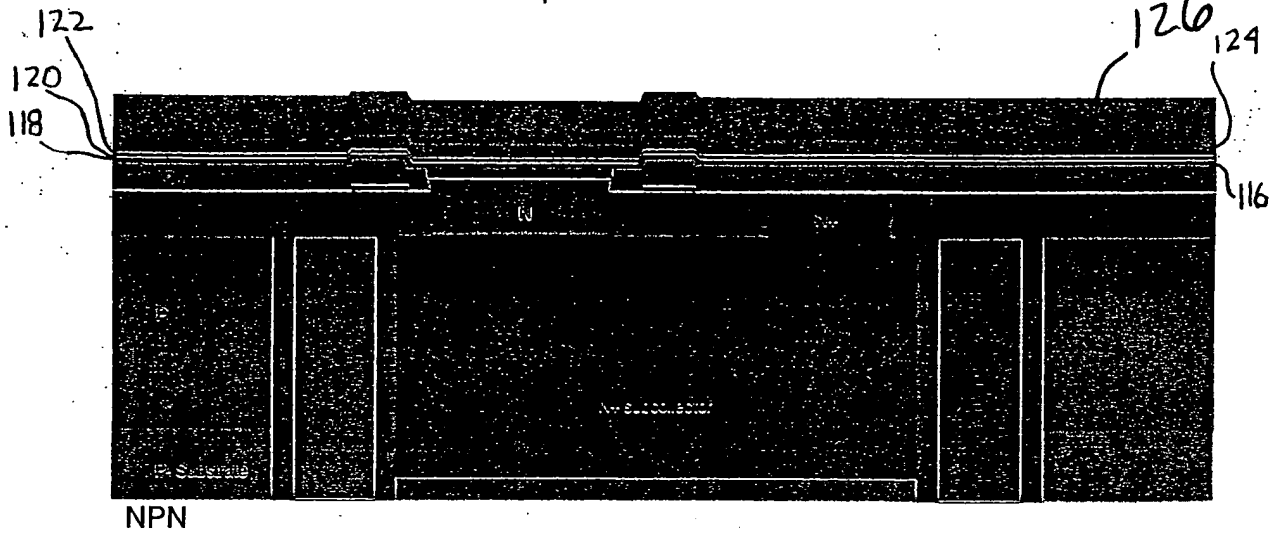


FIGURE 8

FIGURE 8

EN MASK: Define emitter and extrinsic base

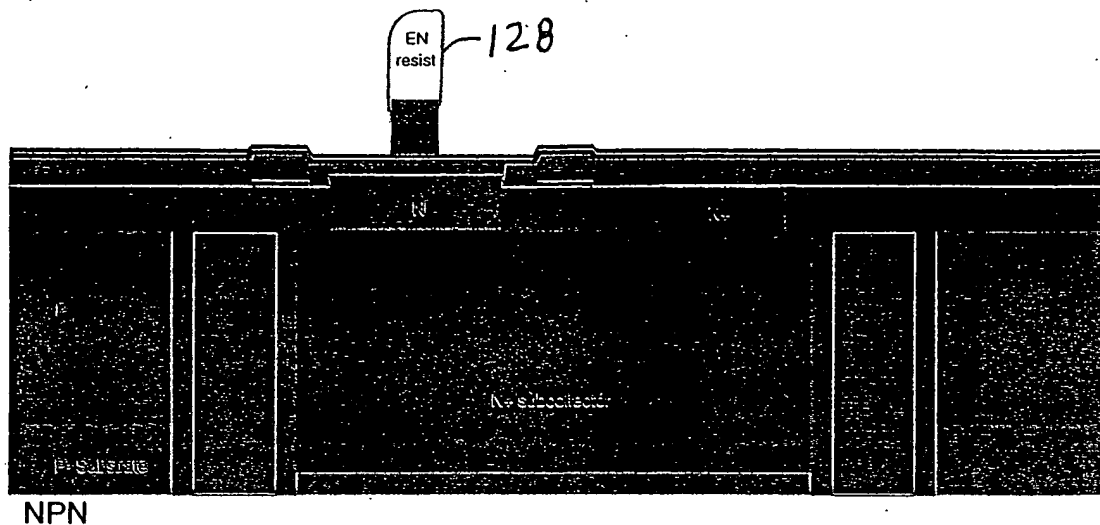


FIGURE 9

FOOT 247660

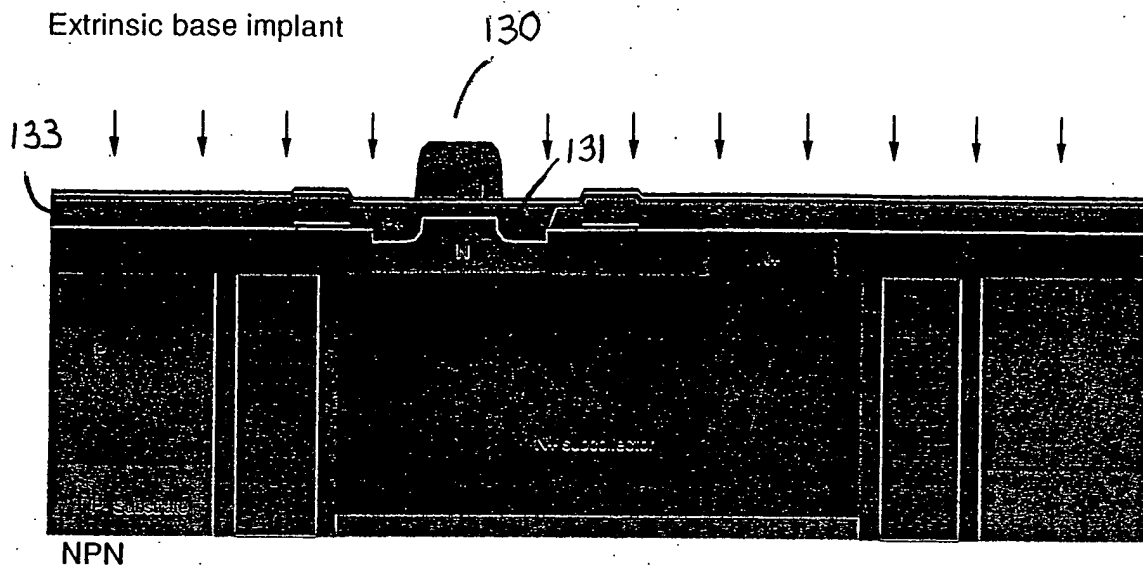


FIGURE 10

TOP SECRET

Etch emitter opening

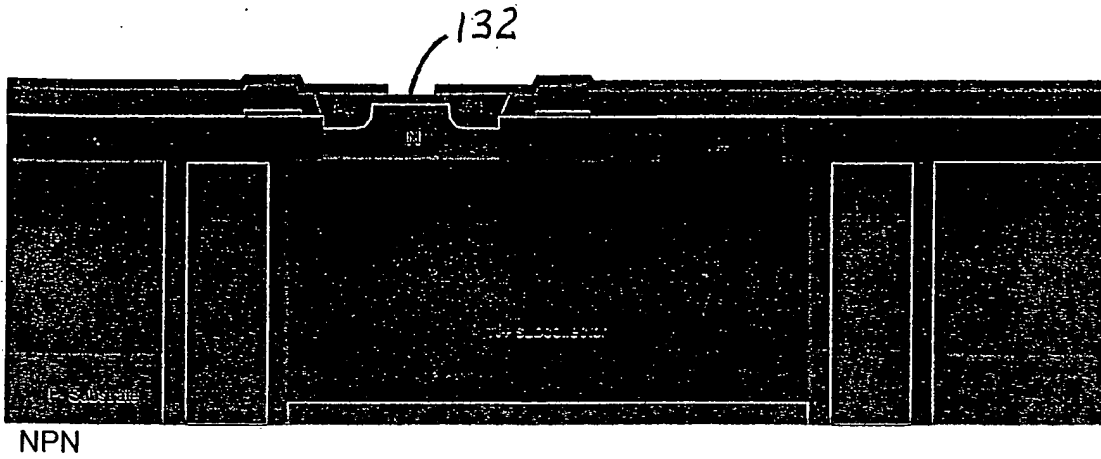


FIGURE 11

FIGURE 11

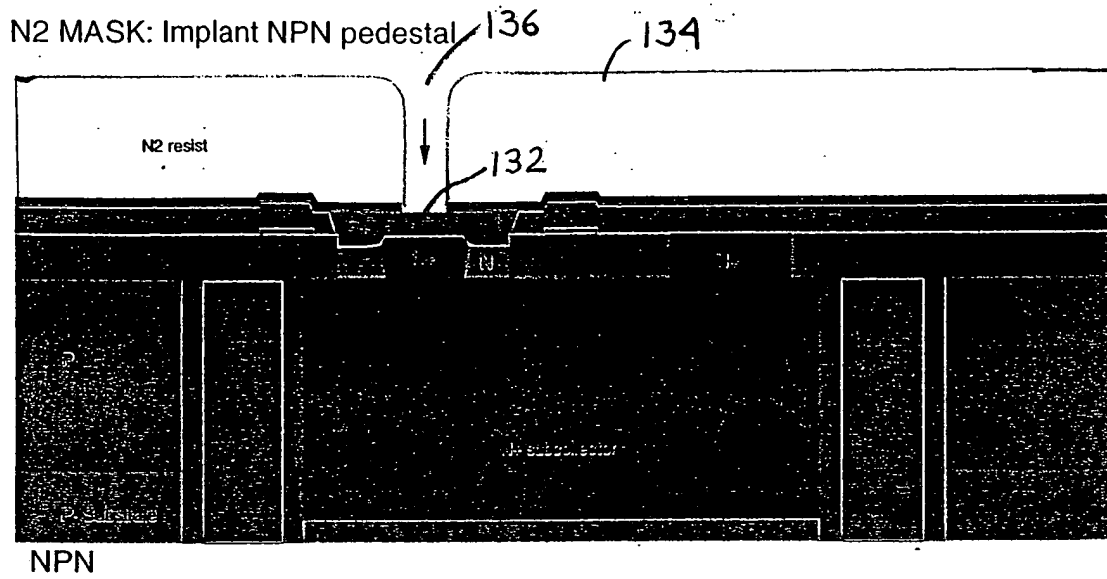


FIGURE 12

FIGURE 12

NP MASK: Etch NPN emitter poly and emitter films.

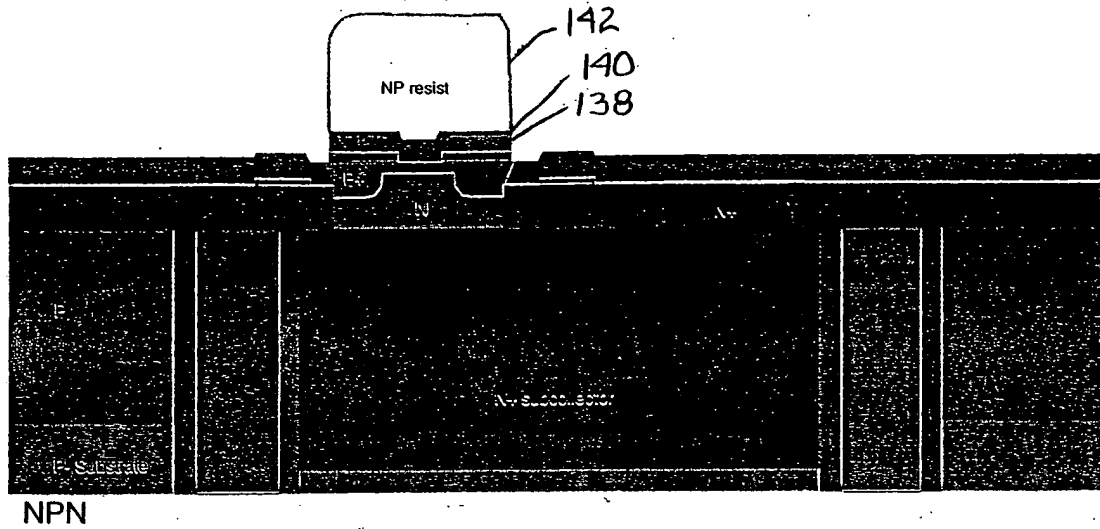


FIGURE 13

FIGURE 13

PB MASK: Etch NPN base poly and FET protect oxide

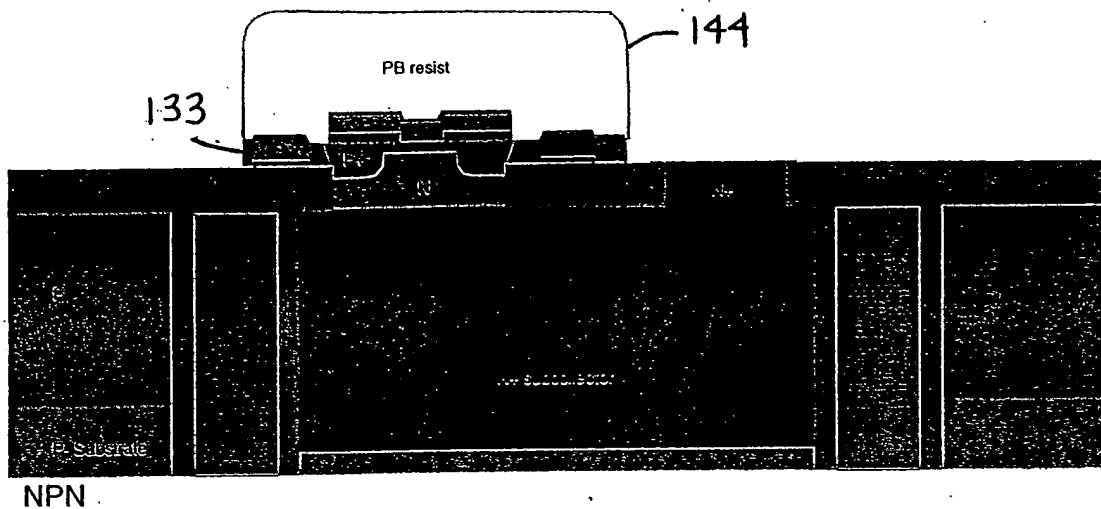
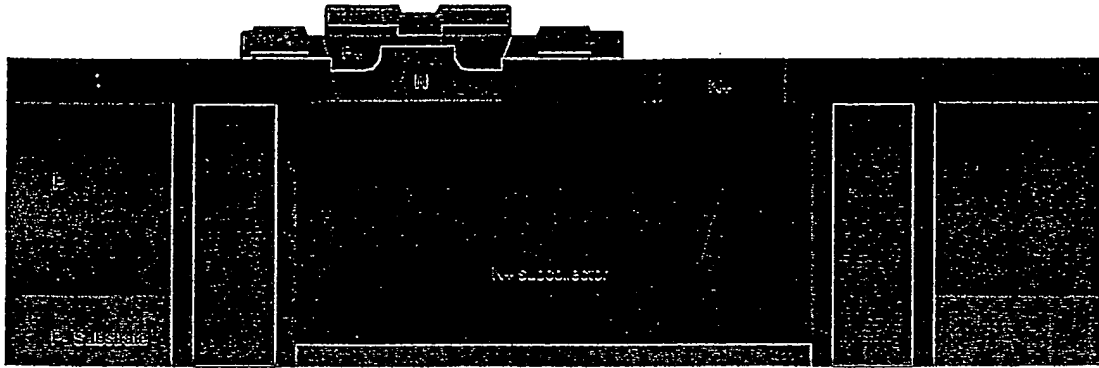


FIGURE 14

OP MASK: Form NPN spacer and resistor TiSix block

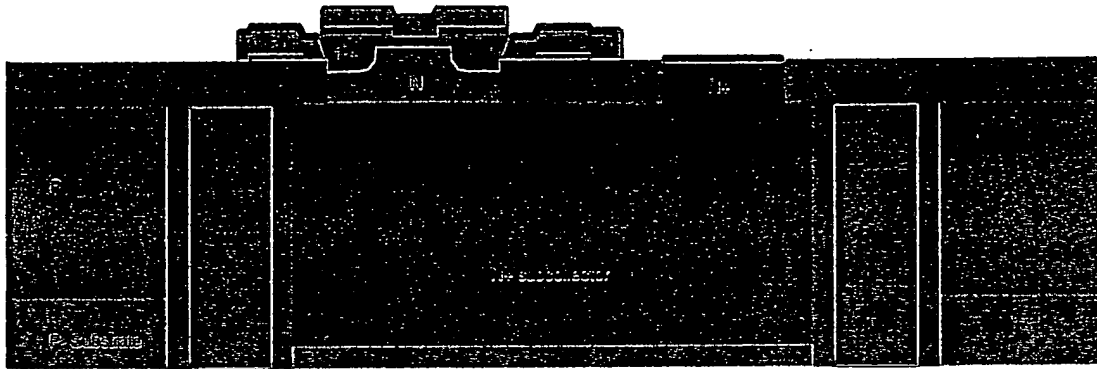


NPN

FIGURE 15

TOP LEFT: 24T1550

After TiSix Formation



NPN

FIGURE 16

FOUO "247660

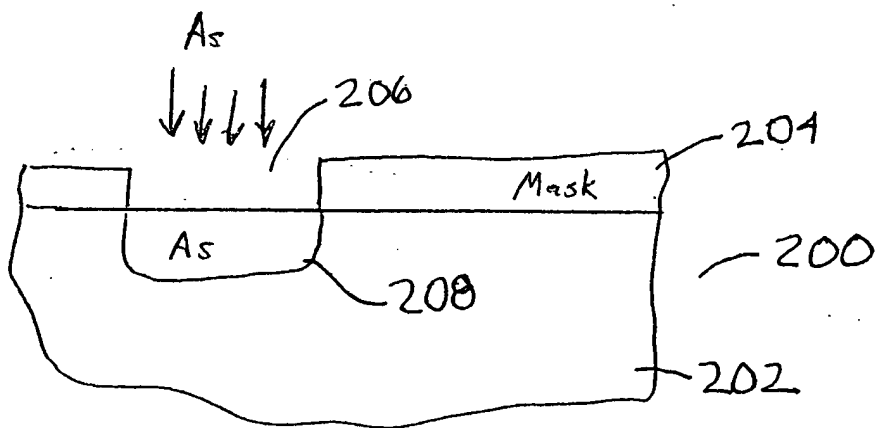


FIGURE 17

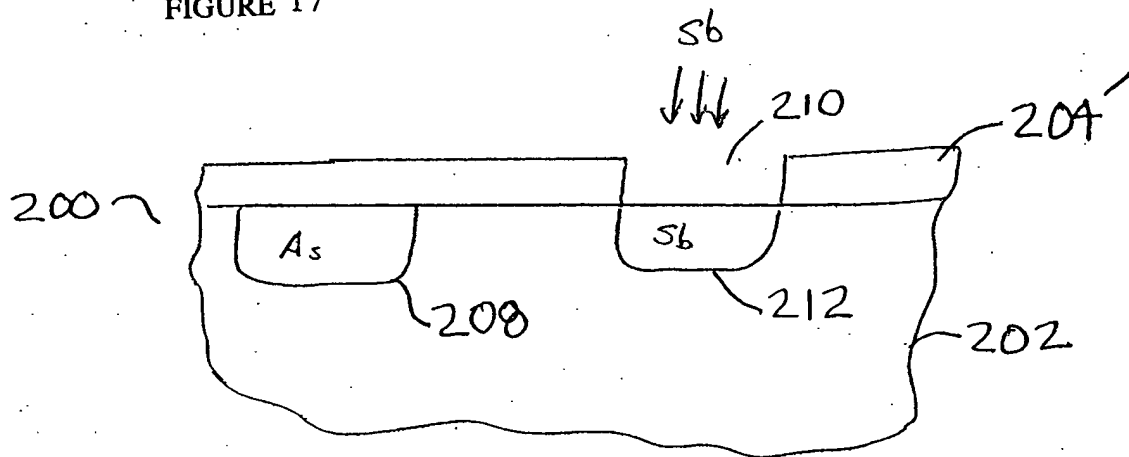


FIGURE 18

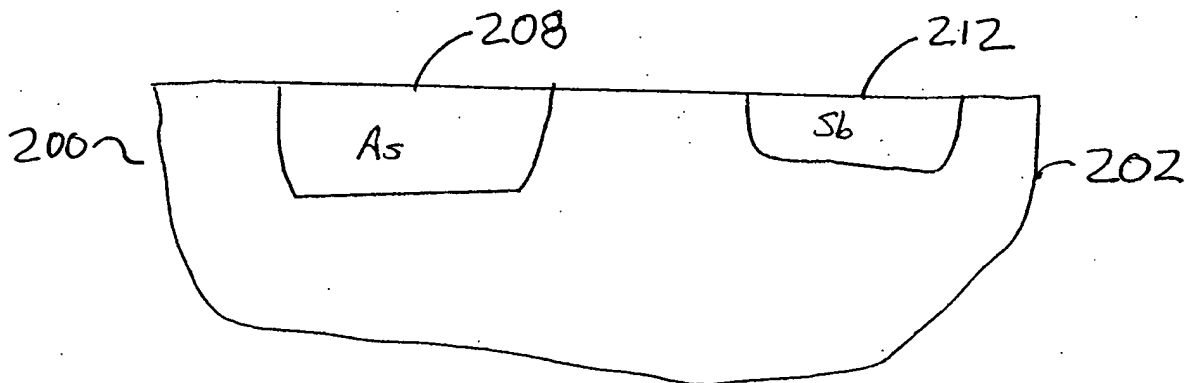


FIGURE 19

FIG. 17

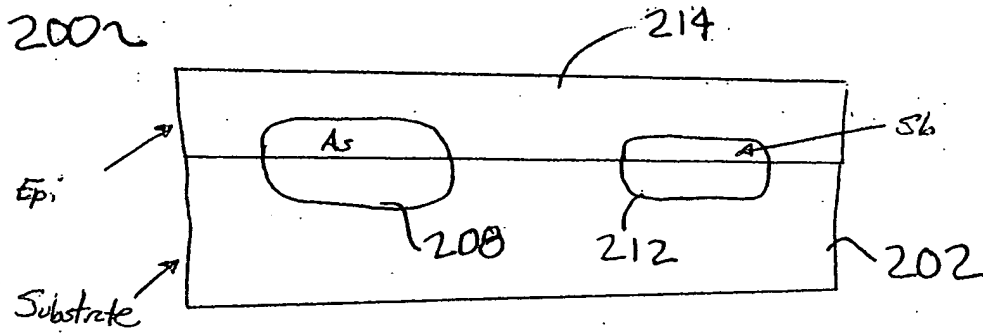


FIGURE 20

FIG. 20

SiGe HBT Transistor

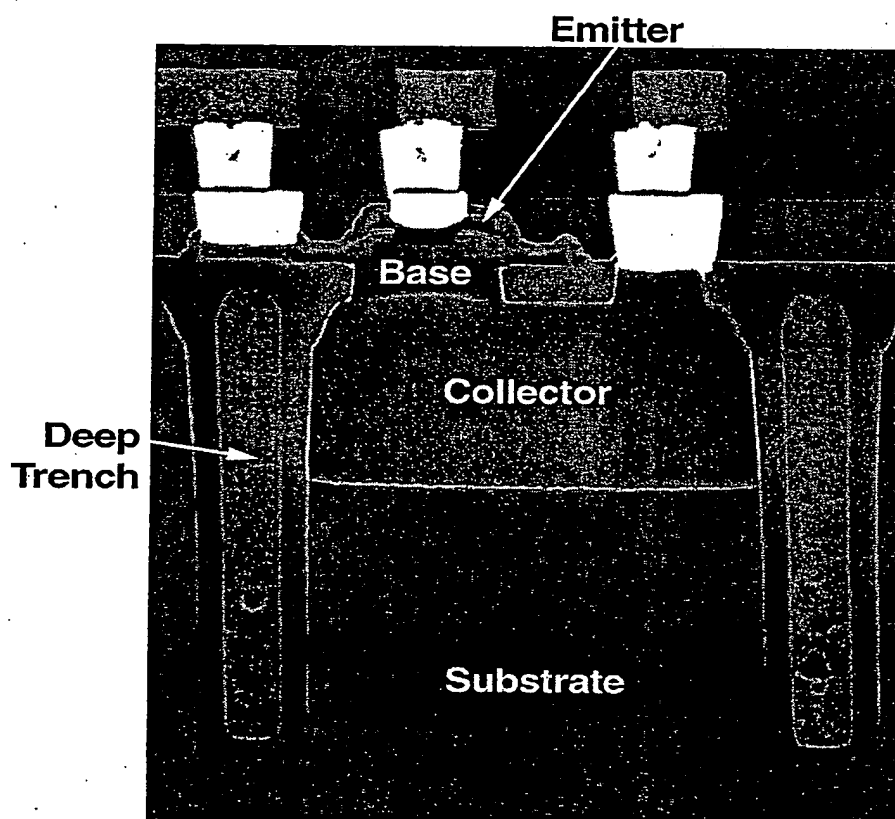
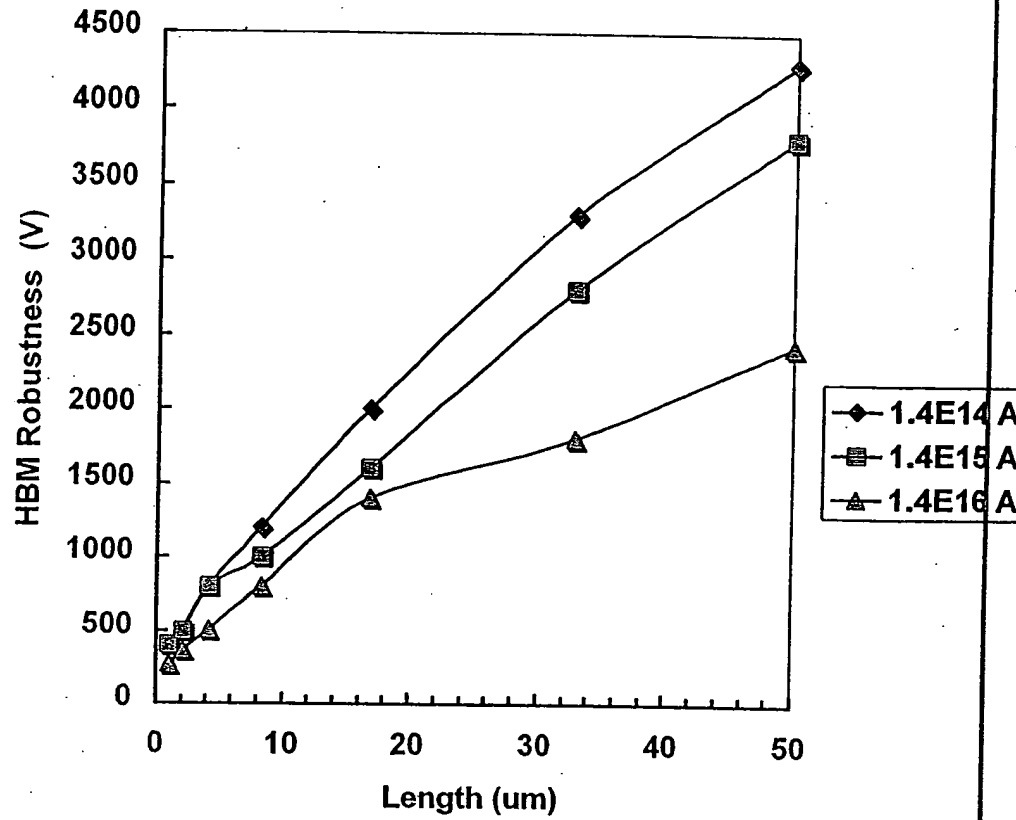
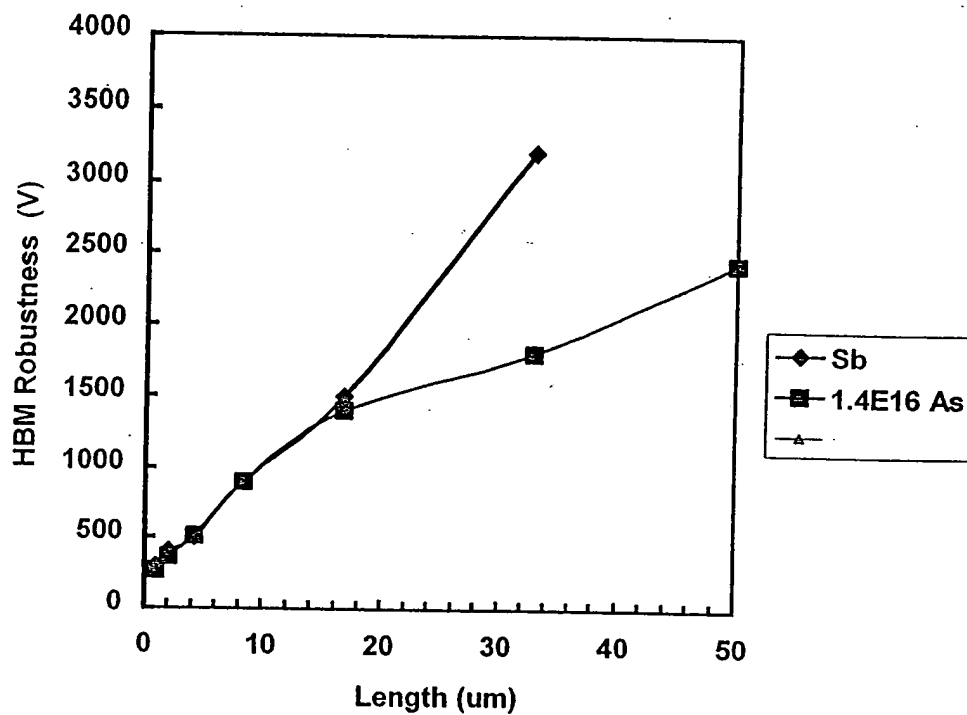


FIGURE 21



Base-Collector ESD Robustness of SiGe HBT for Different Epitaxial Subcollector Doses.

FIGURE 22



ESD Robustness of a SiGe HBT for Epitaxial As and Sb Subcollectors

FIGURE 23

Varactor Width (um)	Varactor Length (1 um)	POR As Subcollector HBM Results POSITIVE HBM PULSE	Sb Subcollector HBM Results POSITIVE HBM PULSE
0.32	1.0	270 -300 V	400-700 V
0.32	2.1	360-390 V	500-600 V
0.32	4.2	510-570 V	800 V
0.32	8.4	540-900 V	1100-1300 V
0.32	16.8	570-1560 V	1300-2100 V
0.32	33	540 - 570 V	3500-3700 V
0.32	50	2610-2670 V	3700-4300 V
0.44	50	2700-2800 V	4000-4200 V

ESD Results of Sb SiGe Varactor Structure vs As SiGe varactor (No pedestal)

FIGURE 24

Varactor Width (um)	Varactor Length (1 um)	POR As Subcollector HBM Results	Sb Subcollector HBM Results
0.32	1.0	120-150 V	300-800 V
0.32	2.1	120 V	300-600 V
0.32	4.2	120-150 V	300 V
0.32	8.4	150 V	200-300 V
0.32	16.8	150 V	300-700 V
0.32	33	150 V	300-900 V
0.32	50	150 V	400-1400 V
0.44	50	150 V	400-2100 V

ESD Results of Sb SiGe Varactor Structure vs As SiGe varactor (No pedestal)

FIGURE 25

FOOTPRINT "24" T6660